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UNARMOURED SHIPS.

LONDON : PRINTED BY
SPOTTISWOODE AND CO., NEW-STREET SQUARE
AND PARLIAMENT STREET

UNARMOURED SHIPS.

BY

THOMAS BRASSEY, M.P.

LONDON:
LONGMANS, GREEN, AND CO.
1875.

UNARMOURED SHIPS.

The duties and services, which vessels of war are required to perform, are so various in their nature that it is altogether impossible that the same classes of ships can be advantageously employed, both in line of battle and for the police of the seas. It will accordingly be more convenient, in discussing the shipbuilding policy of the Navy, to divide the armoured from the unarmoured classes.

In the following pages it is proposed to consider what types are best adapted for the protection of commerce, and for maintaining our communications in time of war. These are duties for which speed, both under sail and steam, and seaworthiness under every condition of weather—in short, all the qualities which tend to make a ship ubiquitous—are essential. If it is desired to combine them with moderate tonnage, armour must be abandoned.

Unarmoured ships indispensable.

The construction of an armoured fleet does not make unarmoured ships the less necessary. The House of Commons was cautioned by Lord Clarence Paget, in moving the Naval Estimates in 1864, that it would be a mere deception of the public to pretend that the in-

crease of the armour-plated vessels would lead to any diminution in the number of unarmoured ships.

Our commerce the special object of attack.

The protection of commerce would certainly be a difficult task for our Navy in the event of war. The ablest officers in the French service have abandoned the idea of contending, to use the words of Baron Grivel, with the '20,000 guns of our fighting Navy.' Their aim would be to pursue the '50,000 merchant ships' which are continually engaged in transporting the wealth of England over the watery plain. They believe that the French fleet could carry on for an indefinite period a privateering war, and that the immediate result would be a rise in the rates of insurance and the transfer of the great carrying business of the sea from British ships to foreign flags. They assume that the great source of our national prosperity would thus be destroyed, and that a state of commercial and financial suffering would ensue, of which the sagacious and far-seeing men who direct the government of England would soon grow weary.

The same policy would be adopted by the United States. They have hitherto declined to engage in a costly rivalry with the maritime powers of the Old World, by constructing the armoured ships, until lately regarded as indispensable to a fleet designed to engage an enemy in line of battle. Their views as to the kind of maritime operations they could undertake with the greatest prospect of success appear to coincide exactly with the plans propounded by Baron Grivel. In the *Congressional Globe* report of the proceedings

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in the United States Congress of December 4, 1872, the evidence is quoted, which had recently been given by Admiral Porter before the Committee of Congress on the decline of commerce. He had been asked the following question: 'I understand you to say that if, at the commencement of the late war, we had had thirty steamers like those running to New York from Europe, they would have been as efficient as our entire Navy?' He replied: 'Twice as efficient. I say that without hesitation. The ships we had could catch nothing. We never had a vessel that could run down a blockade-runner during the whole war, except the "Vanderbilt" and two others. Our ironclads are only suitable for harbour defence. In case of war with Great Britain or France, our powers would be exerted in cutting up their commerce. Great Britain could not stand a war six months with the fleet of ships we could send out after her vessels. They would break her up, root and branch, and that kind of warfare would be more likely to bring about peace than fighting with ironclads or heavy war vessels.'

The classes of ships best adapted for the protection of commerce.

Assuming, therefore, that in the event of war our commerce would be the principal object of attack, it is important to consider what types or classes of ships are the best adapted to protect our commerce, to keep open our communications with our foreign settlements, and to convoy the supplies of food from abroad, which are indispensably necessary to the sustenance of our population.

For such a service we do not want large and costly

Not large ships.

ships. The class of vessels required for the vedettes and sentries of a fleet of line-of-battle ships, to do for the fleet what the cavalry does for an army, requires more consideration than has yet been given to the subject. The sailing fleets of olden times were attended by a numerous flotilla of corvettes, brigs, gunboats, and cutters. In the present day the screw ship of the line has acquired the same mobility as the smallest and lightest vessel; but, just as in military operations on land, a whole battalion should not be told off to take the post of a sentry, nor a regiment of cavalry to escort a solitary staff officer, nor 130 pieces of cannon to convoy a letter, so it would be a culpable waste of power to employ powerful and costly ships in services of secondary importance.

A general concurrence of opinion can be shown to exist on this question abroad and at home, and both in and out of Parliament. In the debate on the Navy Estimates of 1866, Mr. Hanbury Tracy said there was 'a prevalent impression throughout the Navy that fast seagoing cruisers and despatch boats were what we wanted for the safety of our commerce. The cruising vessels should be able to go thirteen to fourteen knots, while the despatch vessels should have a speed of from fifteen to sixteen knots.' In the same debate Mr. Graves said that 'we wanted swift handy vessels of moderate size, capable of remaining at sea twelve months under canvas, and of steaming at a high rate of speed on an emergency.' We require for cruising purposes, for showing the British flag in foreign ports in time of

peace, and for protecting our commerce in time of war, vessels of the 'Alabama' class, or of the far more formidable class of the 'Amethyst' type, of 1,900 tons, 350 horse-power, and 14 guns. Such vessels can be built for 70,000*l.* and must always be most valuable.

It is admitted that the smaller cruisers must succumb to larger vessels in an engagement; but it does not follow that the smaller classes are incapable of doing effective service. The prospect of meeting a 'Raleigh' or 'Inconstant' is remote.

Vastum maris æquor arandum.

A ship of small size may have fully repaid her cost by the destruction inflicted on an enemy's commerce, before she meets with an adversary of overwhelming power; and, even then, in an engagement between unarmoured steamers, the chances of firing a fatal shot into the engine-room are about equal for either ship.

Why some larger ships required.

For certain important services, and especially for the purpose of securing the means of escape from a more formidable iron clad by superior speed, a larger class of ships may be required; but if the same qualities of speed can be obtained in the smaller ships, even though they mount fewer guns, there is much to be said in their favour. The 'Inconstant' is necessarily an expensive ship for the service she is intended to perform. The original cost was 214,000*l.*, with subsequent expenditure of 20,000*l.* for repairs. It was in consequence of the representations of Admiral Porter that the proposal of a subsidy to

ocean-going merchant steamers was entertained by Congress. But if the privateers, with which we may have to deal are mail steamers converted into lightly armed men-of-war, it is not necessary for us to build, at an enormous cost, special vessels, such as the 'Shah,' or the 'Raleigh,' when, as Captain Waddilove has pointed out, we might employ the Cunard steamers, which would be much more efficient, for the same service. If the Cunard steamers cannot attain the extreme speed of the 'Raleigh,' they can maintain a speed of 14 knots for a much longer period; and in coal-carrying capacity they are infinitely superior.

Privateers would not be of large tonnage.

It is not probable that privateering would be undertaken by men of large capital, who would be disposed to spend considerable sums on individual ships. The more reasonable presumption is that the privateers would be of moderate size, of high but not extreme speed, rarely exceeding 12 to 13 knots, and that they would be formidable, not so much from their numbers or their individual power, as from the exceeding difficulty of intercepting and pursuing them. They would avoid probably the most frequented tracks, where alone the six 'Inconstants' demanded by Sir Spencer Robinson could be employed, while our commerce would be imperilled in every other part of the world.

To protect commerce numbers more necessary than extreme speed.

To sweep the seas in search of these wasps it would be essential to send forth a numerous fleet. The 'Inconstant' could never venture to use her extreme speed when cruising in search of an enemy. Her speed

when cruising would be about the same, and therefore her powers of ranging over the ocean would not exceed those of the 'Volage;' and, if the speed of the 'Volage' is adequate for the purpose, it is obvious that the protection of our commerce would be twice as effective, if we had double the number of ships.

Large tonnage not essential for high speed.

Assuming, however, that extreme speed is required, it by no means follows that large tonnage is a necessity. The fastest vessel in the navy, the yacht 'Osborne,' is a comparatively small ship. The fastest ships in the merchant service are the steamers carrying the mails between Holyhead and Kingstown, and the blockade-runners which, during the war of the secession, escaped the United States cruisers by their superior speed. All these are ships of moderate size, when compared with the 'Inconstant.' True it is that her measured mile speed is such that she could escape from any ironclad that has been built; but unfortunately, at her extreme rate, she can only carry a supply of coal for $2\frac{1}{4}$ days' steaming. At the comparatively slow speed of 10 knots an hour, the 'Inconstant' can only carry coal for a distance of 2,160 miles, and could not therefore cross the Atlantic even at the moderate rate of 10 knots from Liverpool to New York.

The cruising speed will not exceed 10 knots.

Whatever be the rate attained on the measured mile, in cruising in search of an enemy, the speed of unarmoured vessels will seldom be allowed to exceed 10 knots. The great consumption of coal at higher speeds will make it impossible to exert the full power of the engines, except when giving chase to an enemy.

So again, if a fleet were despatched on the outbreak of war to take up a position at sea, for the purpose of intercepting the commerce of an enemy, or if ships were sent across the ocean to blockade an enemy's coast, the speed would not be allowed on the voyage to exceed 10 knots.

I quote the following figures from Mr. Reed's tables, which show clearly that the speeds attained on trial can only be attempted on rare occasions, such as the extreme emergency of battle, or the pursuit of an armed ship of an enemy :—

	Coal supply.	Speed of 12½ knots.		Speed of 11 knots.	
		Time.	Distance.	Time.	Distance.
	Tons.	Dys. hrs.	Miles.	Dys. hrs.	Miles.
Achilles . .	620	3 19	1,140	6 9	1,680
Bellerophon .	560	4 11	1,340	7 11	1,970
Hercules . .	600	4 14	1,380	7 17	2,030
Monarch . .	600	5 5	1,560	8 18	2,310

Too much sometimes sacrificed to obtain extreme speed.

It may be doubted whether the tendency, so general among naval officers, to sacrifice every consideration, not even excepting a powerful armament, to speed, is wise and justifiable.

In the debate of 1866 on the Navy Estimates, Lord Clarence Paget told the House of Commons that 'for our police of the seas, we are obliged to employ small vessels, which would be like the brigs used in the last European naval war,' adding that he had 'never heard that these brigs were condemned because they could not go as fast as frigates.'

Mr. Corry.

The late Mr. Corry, than whom no higher authority

on naval administraton can be quoted, concurred in the view of Lord Clarence Paget. In the course of the same debate, he said that 'it would be a great saving of future expenditure if it could be shown that efficient sea-going turret ships might be constructed on a much smaller scale, say 3,500 tons.'

A second 'Inconstant' had been provided for in the programme of 1867–8; but, on Mr. Corry becoming First Lord, it was resolved instead to build a smaller corvette, the 'Volage.' Mr. Corry, as we are told by Sir Spencer Robinson, believed that this ship might be multiplied without extravagant cost, while her speed of 16·128 knots on a six hours' trial trip was rightly regarded as ample for every purpose.

Admiral Porter.

From the United States I may quote the high authority of Admiral Porter as an advocate of small ships for the protection of commerce. In his report of 1871–2, after calling attention to the progress of the principal navies of Europe, he proposed to take steps to make good the great deficiency of the United States navy in cruising vessels, not by constructing 'Inconstants,' but by building twelve wooden vessels of not over 1,000 tons each, and six or eight similar ships of iron. They were to be full-rigged ships, with fine sailing models and good steam power, the propellers to trice up; and all were to be exactly alike.

Mr. Barnaby.

We find our own Naval Constructors expressing their entire concurrence in a policy of moderate dimensions. Mr. Barnaby, in a paper read in 1874 before the Institution of Naval Architects, described

the gunboats of the 'Coquette' class, of 400 tons and 60 horse-power, and the sloops of the 'Arab' class, 600 tons, and the 'Daring' class, 900 tons. All these vessels had an average speed of 9½ to 10 knots. He pointed out that the relative cost of these several types was as 4, 7½, and 9 respectively, and that they were perfectly adapted for the various duties incidental to general foreign service. When, however, it became necessary to provide for an increase of speed to 13 knots—the lowest speed admissible in ships intended to protect commerce and destroy privateers—the displacement must be doubled, the horse-power trebled, and the cost of the vessels increased in the proportion of 21½ to 9. All this had actually been done in the 'Magicienne' class. Now, the question he asked was 'whether we were justified in going beyond the dimensions of the "Magicienne," and whether, in the "Rover" and "Bacchante" classes, there had not been some sacrifice of the just balance of good qualities, reckoning moderate cost as one of them, in aiming at too high a speed? It is always difficult,' he said, "to content one's self with a working speed, which, we may be satisfied, is on the whole the best, so long as a foreign power possesses ships of a similar class with higher speed. There are always people who are willing to insist upon the enormous superiority of even a slight excess of speed.' Mr. Barnaby believed 'there was a great tendency to exaggeration in that respect, and that a maritime war would show that working speeds of over 12 to

13 knots would be found to have been generally too dearly bought.'

Tendency to exaggerate the value of speed.

This wise caution reflects the greater credit on the judgment of Mr. Barnaby; because there is a natural tendency, from a naval architect's point of view, to exaggerate the importance attaching to speed. Of the many qualities which a man-of-war ought to possess, speed under steam is the first in order of time, which can be distinctly ascertained. Seaworthiness, on the other hand, can only be tested in a long cruise. Hundreds of thousands of pounds may have been sunk in some Colossus of the deep; but the waste of the public money on ships not capable of rendering services to the country proportionate to their cost, is forgotten or ignored, while the widest publicity will certainly be given to any successful trial of speed at the measured mile.

'Rover' and 'Bacchante,' cost.

The 'Rover,' having a displacement of 3,494 tons and 700 nominal horse-power, and the 'Bacchante,' of 3,910 tons and the same horse-power, were designed in 1872 to have a measured mile speed of 15 knots. In passing from the 'Magicienne' to the 'Rover,' the cost, as stated in Mr. Barnaby's paper, was increased from 21½ to 40, and to 44 in the case of the 'Bacchante.' The cost of the 'Raleigh' was as 50, and that of the 'Shah' as 60. I do not desire to condemn or criticise the 'Bacchante' class, but I venture to hope that we shall not, except under the most urgent necessity, go beyond the 'Rover' in the unarmoured classes. We can build

three 'Rovers' for the cost of two ships of the 'Shah' type. In discussing the propositions laid down by Mr. Barnaby, Sir Spencer Robinson did, indeed, assert that a speed of 16½ knots in some unarmoured vessels of the British navy is essential to our success upon the seas, and an absolute necessity in order to prevent the commerce of the country from being destroyed. But, as Lord Lauderdale truly said, that necessity can only arise where the privateers which threaten our trade with destruction have themselves a speed of 16½ knots. If their speed does not exceed 13 knots, and no vessels available for privateering at present exist that can cruise at anything like so high a rate, we may be satisfied with a speed of 14 knots for our own cruisers. By avoiding the too prevalent idea that every man-of-war must be able to steam at an extreme rate of speed, we may be able for the same expenditure to build a much larger number of vessels.

Mr. Childers.

In his speech of 1869, Mr. Childers enumerated among the vessels of the navy, efficient for the protection of commerce, twelve corvettes of the 'Blanche' class, with a speed of 13 knots, and carrying 6½-ton guns, two of the 'Druid' class, with the same speed and armament, twelve gun-vessels with a speed of 11 knots and with 6½-ton guns, and seventeen new composite gunboats, with a speed of 10 knots and 6½-ton guns. The total unarmoured fleet consisted of 66 vessels, all of which were put forward, and rightly

so, as capable of performing valuable service, although not endowed with the quality of extreme speed.

If the sole object were to pursue the ordinary vessels of the merchant service, a speed of 12 knots would suffice; but it may be important, as calculated to produce a certain moral effect, to interrupt the regular postal service of an enemy. It will be admitted that the fastest mail steamer does not exceed 14 to 15 knots in smooth water. M. Dislère accordingly suggests that all we want is a somewhat higher speed, and that 15 to 15½ knots is the extreme speed necessary for ships designed to protect or to intercept commerce. 'We should,' he says, 'if we wish to keep within moderate dimensions, be satisfied with the speed strictly necessary to disturb an enemy's commerce. The task of capturing the armed cruisers of the enemy would devolve on a few, a very few ships of extreme speed, such as the "Inconstant" or the "Duquesne."' Fifteen knots the extreme speed required.

The opinion of Mr. Goschen may be claimed in support of a policy of building smaller ships than those belonging to the 'Bacchante' class. In moving the Navy Estimates in 1872, he said that the Admiralty intended 'to increase the number of the *most useful class of ships that they had at that time*, those of the "Amethyst" class. Besides that, they proposed to commence two covered corvettes of the "Active" and "Volage" class, large unarmoured cruisers, going 15 knots; for that was a class they thought they could increase with great advantage. They proposed also to complete within the year the frigates "Blonde," since re-named the "Shah," Mr. Goschen.

and "Raleigh"; but they did not propose to lay down any new frigates. Neither France, Russia, nor Prussia were building any frigates, and it appeared that the time of these large vessels, once a most useful class, had passed away.' It is much to be regretted that the policy indicated in this wisely conceived programme was not more closely followed. The 'Bacchante' class, subsequently introduced, represents an increase, as compared with the 'Active,' of 1,000 tons of load displacement, an advance in the cost of the hull from 80,000*l.* for the 'Active' to 110,000*l.* for the 'Bacchante,' and in the cost of the engines from 39,000*l.* to 72,000*l.* There is therefore a total additional cost of 63,000*l.*; and, if the 'Active' and 'Volage' were of adequate power, our expenditure would have produced a more advantageous result, had we confined ourselves to that type instead of incurring a greater expenditure on larger vessels.

Mr. Goschen's proposals for 1872 also included a corvette of the 'Blanche' class of 6 guns, 1,753 tons displacement, and 350 horse-power, and five sloops of the 'Rinaldo' class, of 7 guns, 951 tons, and 200 horse-power. It is not quite clear what were the vessels to which Mr. Goschen referred in quoting the 'Rinaldo' as a type. If he alluded to the 'Magicienne' class, it will have been shown already that they were much more powerful than the 'Rinaldo.'

The 'Shannon' and 'Shah.'

The disproportionate cost of high speed was conspicuously illustrated in the comparison drawn by Mr. Barnaby between the 'Shannon' and the 'Shah.' The relative displacement was 5,000 tons in the armoured,

as compared with 5,400 tons in the unarmoured ship. But the horse-power of the ironclad was 3,500, while that of the unarmoured ship was raised to 7,500, the enormous increase being required in order to gain 3 knots additional speed. Both ships were constructed to carry 12½-ton guns; but in the case of the 'Shannon' the hull and machinery and the two 18-ton bow guns are protected by 9-inch armour. Compared therefore with the fast unarmoured ships, the 'Shannon,' in the opinion of Mr. Barnaby, will have all the advantages of a first-class ironclad, and would be as unassailable as the 'Hercules' or the 'Sultan.' It is not pretended that the 'Shannon' would compare with the 'Alexandra,' but then two 'Shannons' can be built for the cost of one 'Alexandra.'

M. Dislère.

Passing on to the most recent expressions of professional opinion on this subject, I may refer to the principles so forcibly advocated by M. Dislère in his able work, '*La Marine Croisière*.' 'The displacement must be limited, both because it is desirable to avoid building unhandy ships, and because it is necessary to distribute the strength of the navy, so that all its resources may not be concentrated in a few hulls, exposed, the large no less than the small, to the various dangers of navigation and naval combat. We must therefore give a due proportion to the various elements, which all combine to make the cruiser the distant representative of the national power. No one of these elements must be sacrificed to another, which the fashion of the day represents as of primary neces-

sity, such for example as armour protection or extreme speed.'

M. Dislère suggests that 'the most serviceable cruisers would be vessels armed with two or four 64-pounder guns, with as many guns in addition of a smaller calibre, as it would be possible to place on the upper deck. The maximum speed would be 15 knots. The displacement should certainly not exceed 2,900 tons. 'The loss of a ship of that size would not be such a serious catastrophe as the loss of a vessel like the "Inconstant" or "Duquesne," costing a quarter of a million sterling; and the services performed, so long as the cruisers were restricted within their appropriate sphere, would be much the same whether the vessel were a small corvette or a large frigate of extreme speed.'

Admiral Touchard.

The best type of cruiser, according to Admiral Touchard, should be a wooden ship, of greater speed than the majority of the foreign ironclads, more handy under canvas, and costing one-third or one-fourth of the price of the larger ship. That is to say, for the cost of an ironclad cruiser with a covered battery, you would have three or four wooden ships, their guns mounted *en barbette*, of higher speed, and far better adapted than any ironclad for long and distant cruises in time of war.

The German Navy.

The Germans have not attempted to introduce vessels of the 'Raleigh' type into their Navy. They have three new corvettes, the 'Ariadne,' the 'Freya,' and the 'Louise,' of 1,258 tons and 350 horse-power; and they have one larger vessel of the same dimensions

as the 'Magicienne' class, the 'Thusnelda,' of 1,846 tons and 800 horse-power. The smaller vessels are armed with five 200-pounder guns. Their armament therefore is relatively powerful; but they are too few in number to engage in aggressive warfare with a first-rate maritime power.

Our relative strength in unarmoured cruisers.

Our strength in unarmoured cruisers is still in excess of that of any other naval power. For every 1,000 tons of merchant shipping our fleet of cruisers contains 32 tons, while the proportion which the tonnage of the armoured cruisers bears to every 1,000 tons of merchant shipping is in the French Navy 14 tons, and in the German Navy 4 tons.

According to the *Marine Verordnungs-Blatt*, the German Navy does not aspire to be the rival of the French, or to give absolute protection to German commerce in time of war. Little has been done, in point of fact, to protect German commerce. The old frigates, such as the 'Hertha' and 'Medusa,' are useless for such a purpose. No originality has yet been exhibited in naval architecture for the German navy. It has been thought sufficient to repeat the types which we have tried and found successful, and to be guided by the counsel of that able naval architect, Mr. Reed, whose resignation of his office at the Admiralty was a public misfortune.

The large American frigates.

While the naval powers of central Europe have shown no inclination to enter into competition with England in the construction of more powerful cruisers than our own, the United States have made constant

efforts to surpass the Navies of other maritime nations in the speed, dimensions, and armament of their cruising ships.

In 1855 they made a great stride in advance of anything which had been done before, by building the 'Colorado' and the 'Merrimac,' ships of 4,600 tons, which, however, failed to attain a speed of more than 9·5 knots. The 'Niagara,' from the designs of the celebrated shipbuilder, George Steers, came next. The dimensions were increased in this case to 5,475 tons, and the maximum speed attained was 12 knots.

The English Admiralty followed in the same line by building the 'Doris,' 'Orlando,' 'Mersey,' and 'Galatea,' vessels without a rival in any European Navy. The great advance in the size of the modern frigates is sufficiently proved by the fact that the 'Emerald,' though of moderate dimensions when compared with several frigates built in the later days of wooden ships, was a ship of 2,913 tons, or 31 tons larger than Nelson's famous three-decker, the 'Victory.' The 'Emerald' attained a speed of 13 knots.

Fast steamers in merchant service.

In or about the year 1860, some steamers of remarkable speed were introduced into the merchant service. The 'Connaught' and three sister vessels were constructed for the mail service between Holyhead and Kingstown. The 'Connaught' maintained, for six months consecutively, an average speed of 15·45 knots. Among ocean steamers, the 'Persia' acquired a just celebrity. On one of her transatlantic trips this vessel maintained an average speed of 12·31 knots throughout the voyage.

During the war with the Secessionists, some fast corvettes were ordered for the United States Navy, the Confederate cruisers, though inferior in armament, having been found superior in speed to the ships of the United States Navy. In order to obtain higher speeds vessels of 3,200 tons were laid down. Of these, the 'Guerrière' steamed 12 knots, but the 'Odaho' was a failure, and the result in the case of the 'Wampanoag' must be hereafter described from American sources.

'Inconstant' ordered

Meanwhile, the English Admiralty had become disquieted by the reports, which had been circulated relating to the new American corvettes, and in 1865 they proposed to build seven ships of the 'Inconstant' class. In France some vessels were proposed for a similar service, but of much more moderate dimensions. The 'Château Renard,' of 1,900 tons, and a speed of 14 knots, is an example of the type adopted.

The event proved that our naval administrators had been most unnecessarily alarmed by the reports they had received of the anticipated performances of the new American corvettes. It was stated in the report of the Board of Steam Machinery Afloat in 1869, that the cost of the 'Wampanoag' was 315,000 dollars; that she could carry only 750 tons of coal, of which 200 tons were stowed on the berth deck, and that this supply was barely enough for four days' steaming at full speed. Owing to the acute shape of these vessels not a single gun could be used on her gundeck in giving chase to an enemy ahead, and even the use of the stern guns was essentially ham-

Board of Steam Machinery, 1869.

pered by want of room. They declared that no wooden vessel of war of such great length and small proportionate depth, however well put together, could endure rough seas without evincing a palpable want of longitudinal rigidity. They complained also of the slowness in turning. The engines and coal represented 84 per cent. of all the weight the hull could accommodate below the water line, and thus but 16 per cent. was left for masts, sails, cables, ordnance, and provisions. They said 'that the "Wampanoag" had undoubtedly proved very fast. For twenty-four consecutive hours her average speed was 16·95 knots, while her maximum speed was 17¾ knots; but at this extreme rate her consumption of coal was 175 tons a day; and she could only carry fuel enough to steam 950 miles. The quality of high velocity was thus about all that had been really established as to her merits as an efficient vessel of war. The weight of her battery was insignificant. Her accommodation for provisions was insufficient. Her accommodation for chain cables was also inadequate, as those on board were altogether too short for a vessel of her length to be moored with convenience. Her accommodation for her crew was strikingly confined, and in warm climates, with steam up, she would have been almost uninhabitable. Looking upon her as a whole, and especially in the light of a naval vessel for general naval purposes, it seemed impossible to resist the conclusion that she was a sad and signal failure, and utterly unfit to be retained in the service, and that she would therefore prove a happy

riddance upon any terms that would requite the value of her convertible materials.' The Americans finally decided on making considerable reductions in the engine power of this class, and abandoned completely the intention of giving them the extraordinary speed originally contemplated. Four boilers were removed, and these vessels can now steam at the rate of 10 knots an hour.

Officers who, in the excess of their zeal for the efficiency of their own service seem disposed to require that every ship built for the British Navy should be without a rival in every quality, which can contribute to the efficiency of a ship of war, should carefully consider this short history of the 'Wampanoag' scare.

State of United States Navy, 1870.

We have seen how the House of Commons was alarmed at the threatened superiority of the American cruisers, and how they accepted without question the proposal to build the extravagant ships of the 'Inconstant' class. Let us turn once more to America, and see what were the opinions entertained by the Americans themselves as to the state of their Navy. The Board of Steam Machinery Afloat carefully reviewed the condition of their fleet, and with a candour only to be equalled by the self-condemnation so habitual in this country, they, in their report of 1870, observed that 'it was mortifying and humiliating to witness the amount of naval trash that had been turned out, and of which the Navy, as to vessels, was to a large extent composed.'

Admiral Porter, 1871.

Again, in his report of 1871, Admiral Porter said: 'Our naval vessels have in but very few instances developed high speed, 8 knots being the general average, while only a few ships have attained a speed of 12 knots. In the French and British Navies, on the other hand, 14 and 15 knots are almost invariably attained in the iron and wooden vessels built within the past four years.'

Great cost of 'Raleigh' class.

It was a needless alarm which led to the construction of the 'Inconstant,' the 'Blonde,' and the 'Raleigh,' which, whatever their merits, were far more costly than any vessels previously designed solely for engaging small unarmoured cruisers or for destroying defenceless merchantmen.

The original estimate for the 'Shah' was in round figures, 200,000*l.*; the estimate for the 'Raleigh' was 180,000*l.* How far the estimate for this latter vessel has exceeded the sum originally contemplated, it will, I fear, be painful for the dockyards of Chatham and Portsmouth to reveal.

Position of boilers.

One serious defect in the 'Raleigh' class arises from the exposed situation of the machinery and boilers. It has not been possible to place the latter as completely below the water-line and under the protection of the coal-bunkers, as in the wooden screw frigates. The comparatively exposed position of the machinery in the new vessels is the more serious now that steam is used at the high pressure ordinarily maintained in the modern compound engines. A projectile striking the boiler, when steam is carried at

a pressure of not less than 60 lbs., would cause a most destructive explosion. The importance of giving to machinery as much protection as possible was illustrated in the recent action between the French cruiser the 'Bouvet' and the Prussian despatch boat 'Meteor,' in the West Indies. Having rammed the 'Meteor,' and inflicted considerable injury on his antagonist, the captain of the 'Bouvet' was unable to follow up the advantage he had gained; because his machinery had been disabled by a shot, and he was accordingly compelled to return into port under sail.

Last programme.

The most recent programme of the English Admiralty embraces three classes of unarmoured cruisers. At the head of the list, in the first class, are the 'Inconstant' and the 'Shah,' of 5,700 tons and 1,000 horse-power, and the 'Raleigh,' of 4,700 tons and 800 horse-power.

The French, not without regret, are slowly following us in the construction of large unarmoured ships. In 1871 the designs of M. Lebelin de Dionne were approved for the 'Duquesne,' of 5,400 tons and—as it was stated by M. Dislère—of 1,800 horse-power. This ship was to have an estimated speed of 17 knots. The vessel is now being built, though very slowly, at L'Orient. A sister ship, the 'Tourville,' has also been projected. The armament proposed for the 'Duquesne' is composed of twenty 14 c/m. guns and seven 16 c/m. guns. The latter, which are the largest guns admitted into the French unarmoured cruisers, weigh

4 tons 18·5 cwt.; their calibre is 6·48 inches; their battering-charge is 16·5 lbs.; and the service-charge 11 lbs.; the projectile for the former weighing 99 lbs., and for the latter 69·5 lbs.

The second class cruisers of our Navy are represented by the 'Rover' and the 'Bacchante;' and this class includes the 'Boadicea' and the 'Euryalus,' the 'Active' and the 'Volage.' The 'Bacchante' and the 'Boadicea' are ships of 3,910 tons and 700 horse-power, their original estimated cost being 170,000*l.* The 'Euryalus' and the 'Rover' are of 3,450 tons and 700 horse-power, and their original estimated cost was 160,000*l.* The 'Active' and the 'Volage' are of 3,180 tons and 600 horse-power, their original estimated cost being 126,000*l.* The speed of this class is 15 knots.

The corresponding class in the latest programme of the French Admiralty is represented by the 'Duquay Trouin,' of 3,200 tons and 875 horse-power. The estimated speed of the French ships is 16 knots. It should, however, be stated that the estimates of speed and the reported results of actual trials in the French Navy must not be unreservedly accepted. In armament the French ships are decidedly inferior to our own. The armament of the 'Duquay Trouin' is intended to consist of one 16 c/m., or 64-pounder, and eight 14 c/m. guns, while our own ships will carry sixteen 64-pounders and two 7-inch guns. The 'Duquay Trouin' is the only vessel of the class actually in progress in the French dockyards.

For the third class cruisers adopted by the English Admiralty we may take, as a typical vessel, the 'Magicienne,' of 1,800 tons displacement and 350 horse-power. This class includes the 'Encounter,' 'Amethyst,' and 'Modeste.' These ships steam 13 knots, and have been highly approved by the officers, who have commanded them.

The typical vessel of the corresponding type in the French Navy is the 'Rigault de Genouilly,' the only ship of her class now in progress. This vessel is of 1,643 tons and 453 horse-power. Here, again, the French ship has an alleged advantage in point of speed, estimated by her constructors at 15 knots, while there is a considerable inferiority in the proposed armament of eight 14 c/m. guns when compared with the fourteen 64-pounders of the 'Magicienne' class.

Both the 'Duquesne' and the 'Duquay Trouin' are to be capable of carrying coal sufficient to steam a distance of 5,000 miles at 10 knots an hour. The second class shows an inferiority in speed, and a yet more considerable inferiority in armament; but for the services for which these ships are designed they give, in the opinion of M. Dislère, who agrees in this regard with Mr. Barnaby, a more satisfactory result than the larger ships, in proportion to the expenditure incurred.

For a blockade numerous ships essential.

The experience of the war against the Confederates in America is enough to show that, when a blockade is to be maintained on a long line of coast, or, where the Navy is called upon to furnish ships to go in pursuit of

privateers or cruisers, few perhaps in number, but roaming at large over the ocean, individual power will not compensate for insufficiency of numbers. In January 1865, there were in the United States Navy 671 ships in commission, the greater number of which were employed in blockading the coasts of the Southern States. Doubtless the blockade might have been more strictly maintained by a smaller number of more efficient ships. But, as the most powerful vessel has not the property of ubiquity, there must be a limit, beyond which increased power and speed cannot adequately compensate for loss of numbers.

Armament

A few observations may here be made on the subject of guns. Ever since the introduction of steam, armament has been sacrificed more and more to speed, reliance being placed on the superior calibre of the guns, as a compensation for the reduction in their number. The increase of calibre is, however, attended of necessity with many serious disadvantages. The fire is slower, the number of guns is much reduced, perfect accuracy of aim cannot be insured; and, where the number of shots is limited, there is less chance of hitting an enemy, and greater loss whenever a shot fails to take effect. The policy laid down in the report of the French Commission of 1824 is as true to-day as it was fifty years ago. The power of a ship cannot be determined by the weight of metal discharged in a single broadside. It would be more correct to say that the power is directly proportionate to the weight of metal which can be fired in a given period of time. For

these reasons the Commissioners condemned very heavy guns for cruisers. At the present day the unarmoured cruiser does not require guns of a sufficient calibre to penetrate armour-plating. For such a purpose 12-inch guns would be necessary; whereas, for the special work of a cruiser, the 64-pounder is sufficiently powerful, and, at short distances, will even penetrate the armour of all but the most strongly-protected ironclads.

The better opinion would therefore seem to be that entertained by Captain Waddilove. He thinks the guns of the 'Inconstant' are too heavy for the mere destruction of commerce, while the vessel is too unprotected to cope with ironclads. The authority of Mr. Childers may be cited on the same side. In moving the Navy Estimates in 1869, after adverting to the armament of 12½-ton guns which had been given to the 'Inconstant,' he proceeded to speak of the 'Active' and 'Volage.' They carried only 6½-ton guns, but that he considered as a calibre quite sufficient for all services connected with the destruction of commerce.

The best armament for a cruiser should consist of two guns of very heavy calibre, with as many additional guns of a calibre not exceeding 64 pounds as it may be possible to carry. In the French Navy none of the guns mounted in cruising vessels exceed the 64-pounder.

The English gun-vessels have generally carried a more powerful artillery than the French vessels of similar tonnage. This advantage is still maintained in the more recent vessels of the 'Avon' and 'Bittern'

class. Gunboats of from 500 to 700 tons, powerfully armed and capable of attaining a speed of 11 knots, are well fitted for the protection of commerce, or to attack foreign cruisers or privateers like the 'Alabama.'

Interrogatories of Captain the Hon. A. W. Hood, R.N.

Having given a general summary of professional opinion on this subject, I can best express the conclusions, at which I have arrived, by quoting the two following questions, propounded by Captain Hood, with the replies of Captain Waddilove. Captain Hood asked a question No. 2,388 in the blue-book of the Committee on Naval Designs: 'Looking solely to the protection of our commerce, and seeing that the "Inconstant," of 4,066 tons, steams 16½ knots at the measured mile, and the "Volage," of 2,300 tons, steams 15¼ knots, would it be more advisable to have a certain number of "Inconstants," or double the number of "Volages?"'

Captain Waddilove, R.N.

He is answered by Captain Waddilove: 'Taking the question of Admiral Elliott, if you are to capture privateers of great speed, you must have something that will equal or surpass them in speed. I think that double the number of "Volages" would be a better provision for the protection of our commerce than half the number of "Inconstants."'

'Do not you think that a vessel of 2,300 tons, possessing the power of steaming 15 knots, has ample speed for the protection of our commerce?' To this question the answer was: 'I should think she probably has; but if the enemy's vessel were faster than that, of course it would be insufficient.'

Mr. E. J. Reed, M.P.

It is proper to add that Mr. Reed expressed a

different opinion before the same Committee. He considered that the moral power of the country would be better sustained in war time by a more limited number of extremely fast ships. He thought that our commerce should be protected by vessels both of the 'Inconstant' and the 'Volage' classes, and that the 'Volage' might meet with vessels which could get away from her, and that that would have a demoralising effect. Up to the present time, however, no such vessels have been built, either for the fighting or the mercantile Navies of any foreign power.

General view of the type required.

The necessity for extreme speed is a relative question. It depends upon the resources of the enemy in vessels possessing that quality, which it is always most expensive to secure. In the actual state of naval power abroad, the most serviceable vessel for the protection of commerce would seem to be a ship not exceeding in any case the dimensions of the 'Volage;' though some vessels of that class might possibly be made more efficient for service in European waters, or even in the North Atlantic, if their spars were reduced, and their steam power and coal-carrying capacity, and perhaps their armament, were proportionately increased.

Committee on designs for ships of war.

The Committee on Designs, while expressing their belief that the 'Inconstant' class was calculated to perform very valuable service, suggested a subdivision, the one class, to possess the sail power of the 'Inconstant,' whilst the other might have increased speed, say 18 knots at the measured mile, with a considerably reduced spread of canvas and a larger supply of coal.

The former class would be the more useful in distant seas, the latter would be the more valuable nearer home.

Programme of 1875–6.

In the Estimates for the present year provision has been made for building 10,359 tons weight of hull of armoured ships, and 3,453 tons only of unarmoured ships. Of the latter there are of iron corvettes with covered battery 1,452 tons, of which the ships of the 'Bacchante' class represents 960 tons, and those of the 'Euryalus' type 491 tons. Of small composite corvettes of the 'Magicienne' class there are to be built 551 tons. Of composite sloops there are to be built 1,050 tons, of which the 'Cormorant' class, of four guns, 900 horse-power, and 642 tons, represents approximately one-half of the proposed tonnage. The ton weight of hull is not the same thing as a ton of displacement, but for the purpose of comparison the mode of calculation adopted in the Estimates is satisfactory.

No exception can be taken to the programme in regard to the proportions the proposed additions to the various classes of ships bear to one another. But, considering the state of other Navies as to unarmoured ships, the next vessel to be laid down should be of the 'Magicienne' rather than the 'Boadicea' type.

The cost of the 'Bacchante' is, for the hull 109,200*l.* and for the engines 72,000*l.*, or a total of 181,200*l.* Hence it will be seen that we can build five ships of the 'Magicienne' type for two of the 'Bacchante' type; and seeing that, for the protection of commerce, the 'Magicienne' class are adequate in power and speed, it is good policy to build ships of the smaller rather

than of the larger type, the latter being unnecessarily powerful for the work they have to do.

We require, in greater numbers than we have them now, ships of the 'Volage' and 'Magicienne' types, or of that smaller class of 1,000 tons, recommended by Admiral Porter for the United States Navy. I gladly acknowledge the efforts that have been made by the Admiralty in this direction; but what we want most of all are vessels of any special class that we should not be likely, in an emergency, to obtain from the merchant service. I would particularly urge, therefore, the construction of a greater number of torpedo vessels. The 'Vesuvius' is our first experiment in this direction. She may or may not be satisfactory. Considering that she is the pioneer of an untried class, it is presumable that defects will be discovered which can be remedied in future vessels. It is the duty of the Admiralty to proceed without delay to increase the number of these vessels, and to improve their efficiency. Our requirements.

The Americans have recently launched a torpedo vessel, of which the following description is given in a recent number of the *Army and Navy Journal*:—

The 'Alarm' draws 10 feet forward and 10 feet aft. The length of keel is 170 feet, including the ram. The beam is 28 feet, and she carries five days' coal. Her armament consists of one 15-inch gun on the bow, to be replaced by a 20-inch smooth bore or a 12-inch rifle. She will carry four Gatling guns on each side, and as many more may be mounted as necessary to defend her from boarding parties.

The guns were fired during the trip and worked excellently.

Her arrangements for firing the torpedoes all go to the pilot-house, and a system of signals is used to order the different spars to be run out, and when they are out, they are in the same way reported to the pilot-house as ready. Thus the whole operation of working the ship, engines, torpedoes and battery is done by the captain in the pilot-house. The spars are twelve inches in diameter, and made of the best gun-metal. They are run in and out by steam. The side spars extend seventeen and a half feet from the side, the bow spar twenty-four feet ahead of the ram. The ram extends fifteen feet forward under water, and for eight feet is solid iron. The gun and bows are protected by four inches of plating. It is intended to put on three inches more, and the displacement is so calculated. The spars will stand a fire of fifty and one hundred pounds of dynamite, being equal to several times that weight of gunpowder. Her crew will consist of five officers and sixty men.

The 'Vesuvius' was built at an estimated cost of 14,000*l.* Vessels of this class may therefore be multiplied without extravagant outlay. Mr. Goschen originally proposed to build a torpedo vessel of 540 tons and 11 knots speed, and this, he said, would not be a costly ship. Such a vessel could certainly be built for 30,000*l.* Even supposing that we went so far as to expend 40,000*l.* on her construction, this would be about the cost of the despatch boats of the 'Lively' and 'Vigi-

lant' class, we at one time built so rapidly, and which made no addition to the fighting strength of the Navy. Properly fitted for the use of the submarine torpedo, which can now be fired from the broadside with such fatal precision, with a speed of not less than 15 knots, and with such powers of turning as it is impossible to give to larger ships, who that reads the signs of the times, with the most modest gifts of judgment and forethought, can doubt that a squadron of ten torpedo steamers would be a more important addition to the navy than a colossal 'Inflexible,' which a single shot from any one of the proposed torpedo vessels would destroy in an instant?

I need not further press the argument against excessive expenditure on individual ships. I would only refer in conclusion to the report of the Committee on Designs and to their emphatic declaration that 'In every description of unarmoured ships, the smallest dimensions, consistent with the attainment of the requisite speed, should be adopted.'

Our Merchant Service.

Hitherto the protection of commerce has been treated as if we were entirely dependent on ships built expressly for war. But the maritime resources of this country are not confined to the Royal Navy. Splendid and powerful as our ships may be, we must inevitably, in time of peace, be deficient in point of numbers. For the tremendous exigencies of war, the fleet might be supplemented and expanded, so as to acquire undisputed ascendency, by equipping and arming our ocean mail steamers.

The resources of our mercantile marine are highly appreciated by naval administrators even in countries where the ocean steam service has not attained to the development it has reached in this country. 'There is,' says the Secretary of the United States Navy, in his report of 1869, 'another element of defence in time of danger, perhaps as effective as any other, available to wise and liberal statesmanship. . . . . Such means would be at hand if we had lines of ocean-going steamers established. There are now running from New York, Boston, and Baltimore to Europe, over 60 powerful screw steamers, any of which could be quickly converted into an efficient and powerful ship of war, capable of carrying full sail power, and keeping the sea for any length of time. Had our mercantile marine possessed such lines at the breaking out of the late war, we might have quickly closed every Southern port. A comparatively small force of this kind, appropriately armed, and let loose on the ocean, under the command of bold and intelligent officers, would be a dangerous foe to the commerce of any country. Our own ships were substantially driven from the seas by two or three roughly equipped vessels, much inferior in power to those of which I have spoken.'

It is a just subject for regret that, while we stand committed to large subsidies for the postal service, the owners of these great lines of steamers are under no absolute engagement to place their ships at the disposal of the Government, in the event of war, at a certain fixed rate of charge. The Crimean war showed the

enormous value of the large fleets of the ocean steam navigation companies. The subsidies granted for the conveyance of letters during peace will, provided we make proper bargains beforehand, secure for the Government an invaluable fleet of cruisers and transports in time of war.

The following figures are taken from the tables showing the progress of merchant shipping, issued by the Board of Trade, for 1874. They prove the strength of our position in this respect by comparison with all the other naval powers.

The aggregate tonnage of the merchant navy of the British Empire in 1874 was 7,213,000 tons; while that of the United States, excluding river steamers and home trade, was 1,410,000 tons, and that of France, 1,677,000 tons.

The tonnage added to the register in 1872 was, for the United Kingdom, 471,518 tons; for the United States, 209,052 tons; and for France 87,000 tons.

The steam tonnage of the British Empire, in 1872, was 1,640,639 tons; that of the United States (oversea trade) 177,666 tons, and that of France 177,462 tons. Of steamers, there were built in the United Kingdom, in 1872, 416,000 tons.

The merchant navy of North Germany, in 1872, comprised a total of 5,082 ships, of 1,308,988 tons, of which 2,090, of 165,178 tons, and 29,139 horse-power, were steamers.

The Russian merchant service was composed of

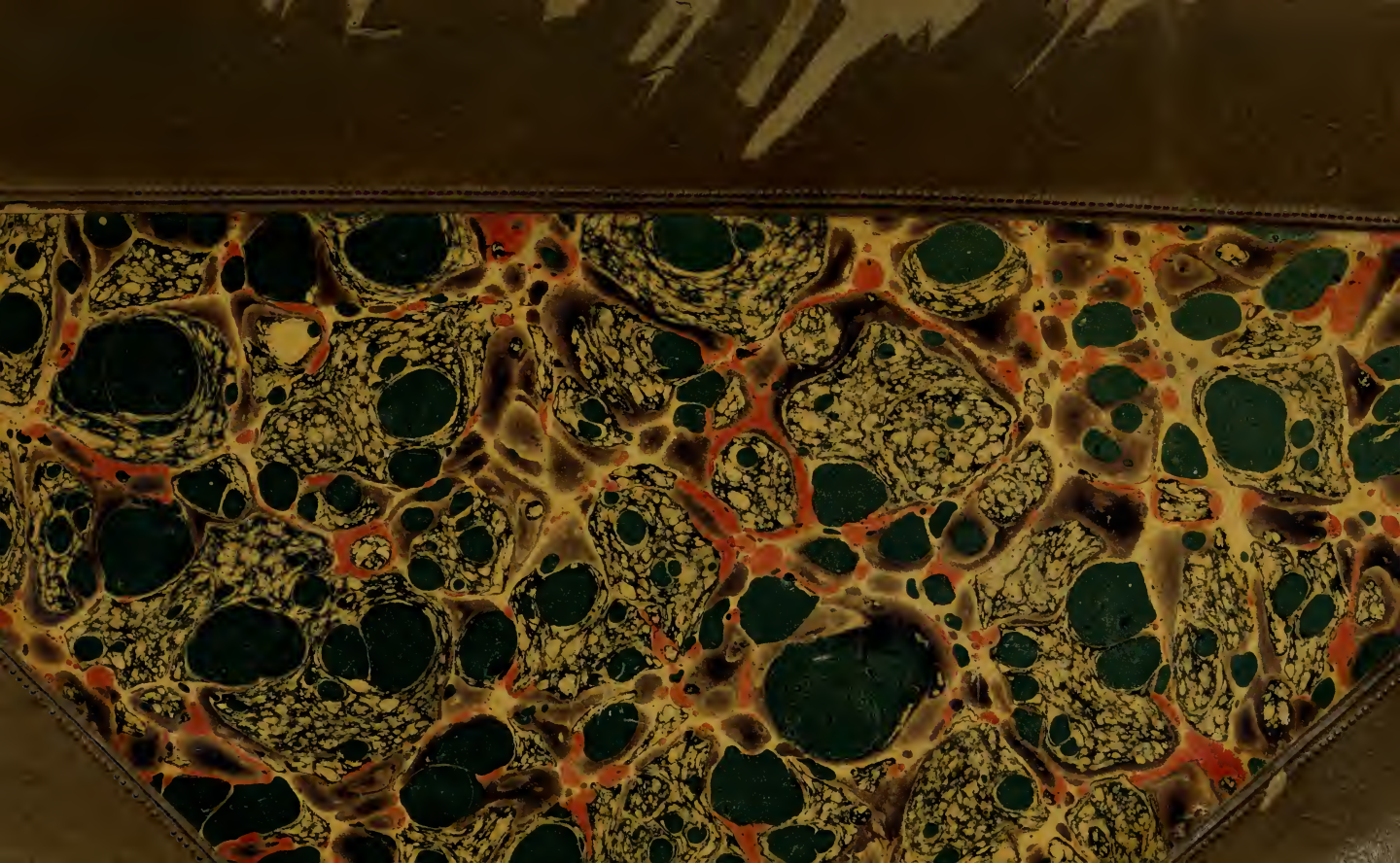
2,514 ships, of 259,773 tons, including 189 steamers, of 13,152 horse-power.

If we were engaged in war, and the resources of our shipbuilding yards were applied exclusively to the construction of fighting vessels, we should in twelve months be able to create an overwhelming fleet. At the Elswick Works, 1,500 men are employed in making guns for every foreign government. In this establishment the British Government possesses another Woolwich, and all its resources would of course be entirely at the disposal of this country in the event of war.

In marine steam machinery we stand at the head of the maritime nations. 'All the recent improvements,' said Admiral Porter, in his report of 1870, 'were made on the Clyde and the Mersey, where giant strides are taking place in the construction of machinery for war and for the merchant service.'

The magnitude of our mercantile marine may be illustrated by pointing to a few of the most important lines. The Cunard Company alone have 49 ocean-going steamships, of 90,000 tons and 15,000 horse-power, far exceeding the entire fleet of the German Empire. In Glasgow alone, Messrs. Henderson Brothers, of the Anchor Line, give employment to 30,000 persons. They build and equip their own ships. The United States have seven regularly established naval yards; but only four of these are capable of fitting out more than two or three vessels at a time; and in the seven navy yards there are but three dry docks, so that, in this most important feature, the entire re-

sources of the United States Navy are inferior to those of Messrs. Laird Brothers.

These facts ought to remove the faintest shadow of apprehension from the most timid and anxious minds. The mercantile marine is an essential element of naval strength. No fighting navy has ever been maintained without the support of a busy maritime commerce. Lord Bolingbroke has truly said:—'By trade and commerce we grow a rich and powerful people, and by their decay we grow poor and impotent. As trade and commerce enrich, so they fortify our country. The sea is our barrier, ships are our fortresses, and the mariners that trade and commerce alone can furnish are the garrisons to defend them. Like other amphibious animals, we must come occasionally on shore; but the water is more properly our element, and on it, like them, as we find our greatest security, so we exert our greatest force.'

LONDON: PRINTED BY
SPOTTISWOODE AND CO., NEW-STREET SQUARE
AND PARLIAMENT STREET